

Updates to the MACCS Consequence Analysis Code

What is MACCS?

MACCS is a computer code that calculates offsite consequences of atmospheric release from severe nuclear accidents.

Offsite consequences

Doses Health effects Economic costs Land contamination

Models treat

Atmospheric transport and ground deposition Statistical effect of variability in weather Dose pathways for cloudshine, groundshine, inhalation, ingestion, and deposition onto skin Protective actions during emergency, intermediate, and long-term phases

Graphical Depiction of Consequence Analysis Release of Effects Plume Protective roperty Ground Population

New Capabilities

Multiple Source Terms: New capabilities to model releases from two or more separate inventories Keyhole Evacuations: Improved capabilities for modeling keyhole evacuations

Additional Outputs: Additional output options for reporting the populations impacted by protective actions

Updated Demographic Data: SECPOP databases updated to include 2010 Census data and updated economic information

Other: Enhanced cohort definition capabilities, more plume segments, more chemical groups, extended release durations, etc.

Keyhole Evacuation

Regions:

Emergency Planning

Shadow evacuation

No evacuation

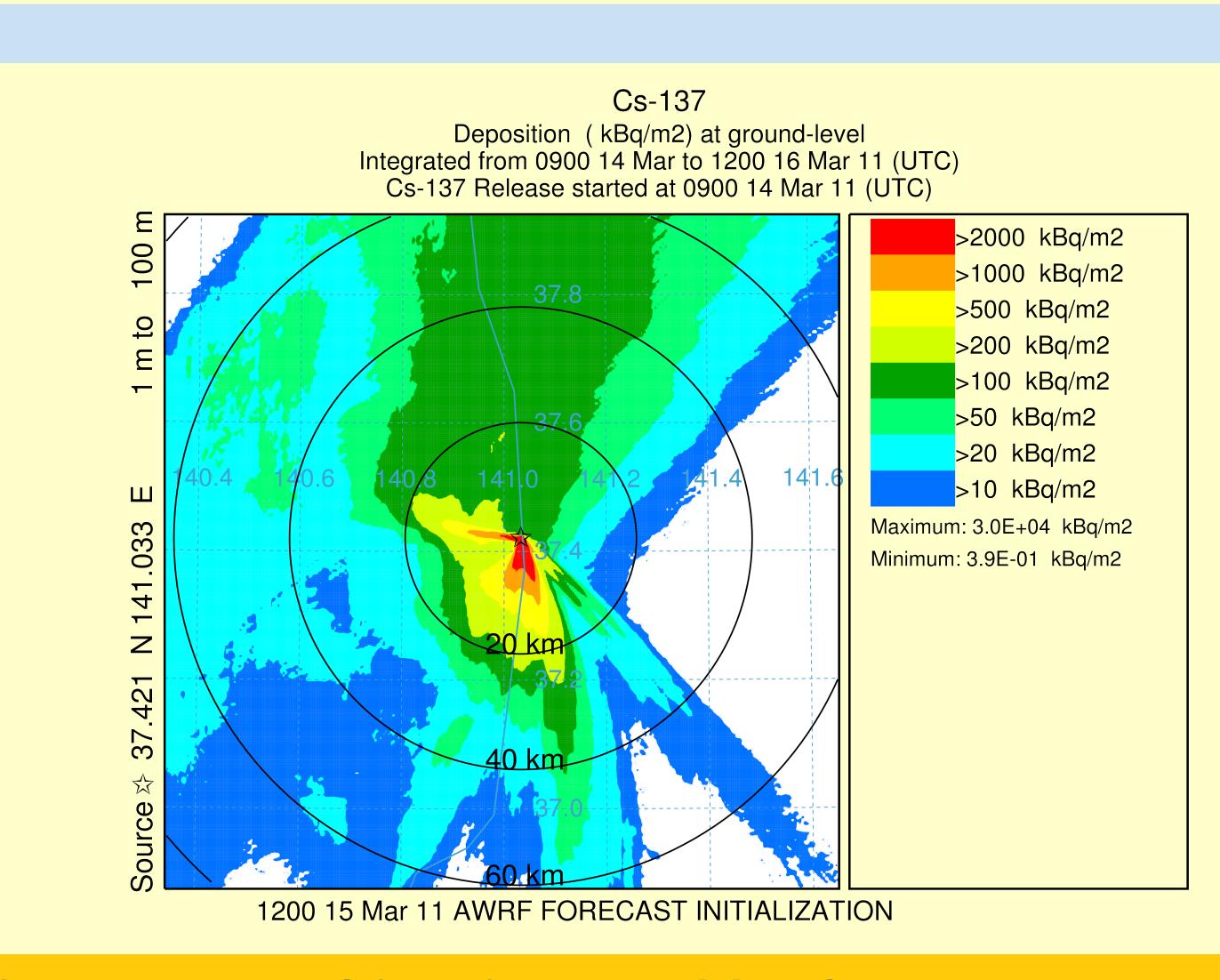
Special facility

Cohort Definitions

Capabilities under Development

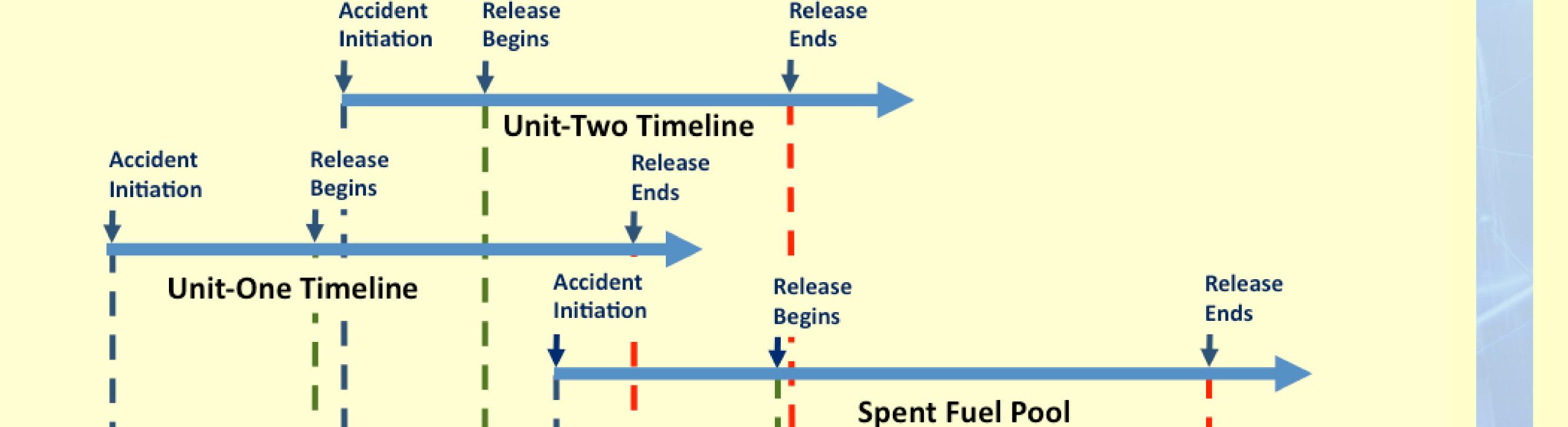
New Alternative Economic Model: The new gross domestic product-based economic model known as "REAcct" will give MACCS the ability to estimate economic impacts using input-output modeling techniques.

New Atmospheric Transport Model: Integration of state-of-the art particle tracking.



HYSPLIT Model of Cs-137 Deposition from Early Release Data

(National Oceanic and Atmospheric Administration test results, 2014)



Timelines of Multiple Source Terms

Atmospheric Transport Modeling

Gaussian plume (Current)

Follows initial wind direction

Empirical dispersion model $(\sigma_{x}(x), \sigma_{z}(x))$

Computation: Fast (seconds to hours)

Gaussian puff

Follows wind field

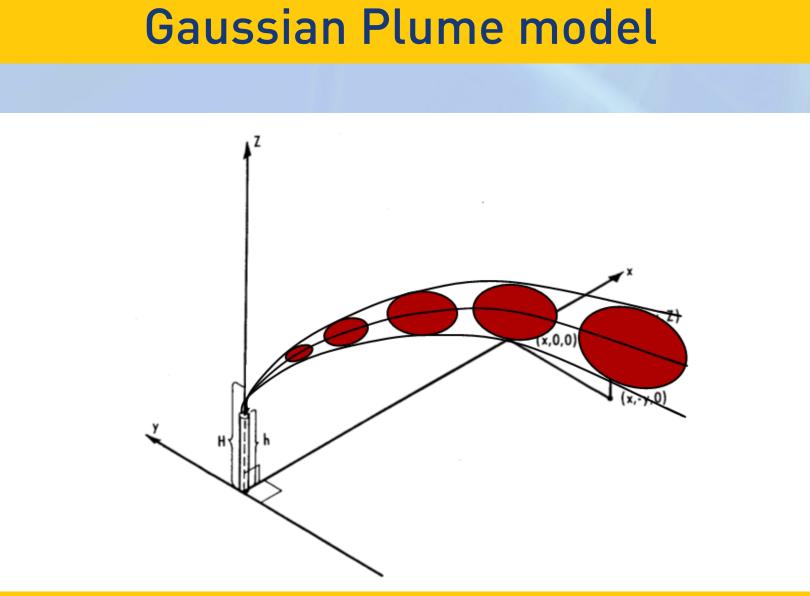
Transient, two- or three-dimensional wind field

Computation: Moderate (minutes to days)

Lagrangian particle tracking

Particles follow turbulent wind vector using laws of motion

Two- or three-dimensional wind field Computation: Intensive (hours to weeks)



Gaussian Puff model

